

FLUKE®

18B

Digital Multimeter

Users Manual

PN 3587281

June 2009, Rev. 1, 1/10

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18B

Digital Multimeter

Introduction

△△ Warning

Read “Safety Information” before using this Meter.

The Fluke 18B (hereafter referred to as “the Meter”) is a 4,000-count instrument.

The Meter is battery powered with a digital display.

Safety Information

This Meter complies with:

- IEC 61010-1:2001 Second Edition
- Measurement Category II, 1000 V
- Measurement Category III, 600 V

In this manual, a **Warning** identifies conditions and actions that pose hazards to the user.

A **Caution** identifies conditions and actions that may damage the Meter or the equipment under test.

Symbols used on the Meter and in this manual are explained in Table 1.

⚠️ Warning

To avoid possible electric shock or personal injury, follow these guidelines:

- Use this Meter only as specified in this manual or the protection provided by the Meter might be impaired.
- Do not use the Meter if it is damaged. Before you use the Meter, inspect the case. Look for cracks or missing plastic. Pay particular attention to the insulation surrounding the connectors.
- Inspect the test leads for damaged insulation or exposed metal. Check the test leads for continuity. Replace damaged test leads before you use the Meter.
- Verify a Meter's operation by measuring a known voltage. Do not use the Meter if it operates abnormally. Protection may be impaired. When in doubt, have the Meter serviced.
- Do not apply more than the rated voltage, as marked on the Meter, between the terminals or between any terminal and earth ground.
- Use caution when working with voltages above 30 V ac rms, 42 V ac peak, or 60 V dc. These voltages pose a shock hazard.
- Use the proper terminals, function, and range for your measurements.
- Do not operate the Meter around explosive gas, vapor, or dust.
- When using the probes, keep the fingers behind the finger guards.
- When making connections, connect the common test lead before connecting the live test lead; when disconnecting, disconnect the live test lead before disconnecting the common test lead.
- Disconnect circuit power and discharge all high-voltage capacitors before testing resistance, continuity, diodes, LEDs, or capacitance.
- For all dc functions, including manual or auto-ranging, to avoid the risk of shock due to possible improper reading, verify the presence of any ac voltages by first using the ac function. Then select a dc voltage range equal to or greater than the ac range.

- Before measuring current, check the Meter's fuses (see "Testing the Fuses") and turn OFF power to the circuit before connecting the Meter to the circuit.
- Do not operate the Meter with the case (or part of the case) removed.
- Use only two-AA batteries, properly installed in the Meter case, to power the Meter.
- Replace the battery as soon as the battery indicator () appears. With a low battery, the Meter might produce false readings that can lead to electric shock and personal injury.
- Do not measure voltages above 600 V in Category III, or 1000 V in Category II installations.
- Remove test leads from the Meter before opening the Meter case or battery door.
- When servicing the Meter, use only specified replacement parts.

 **Caution**

To avoid possible damage to the Meter or to the equipment under test, follow these guidelines:

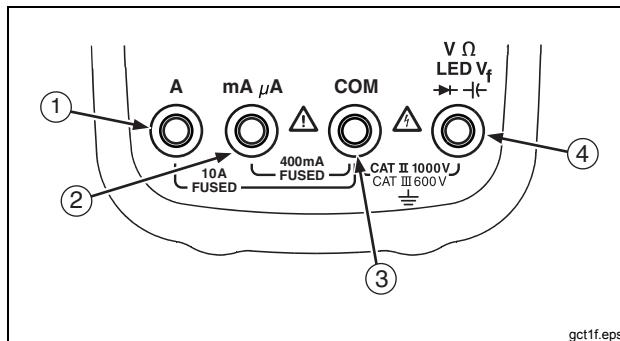
- Disconnect circuit power and discharge all high-voltage capacitors before testing resistance, continuity, diodes, LEDs, or capacitance.
- Use the proper terminals, function, and range for all measurements.
- Disconnect all test leads from any hazardous voltage before switching to the LED TEST function. Refer to the LED TEST section for proper measurement technique and interpretation of results.

Table 1. Symbols

Symbol	Description	Symbol	Description
	AC (Alternating Current)		Earth Ground
	DC (Direct Current)		Fuse
	AC or DC		Double Insulated
	Safety Information		Shock Hazard
	Battery		Complies with EU directives
	Diode		Capacitance
CAT II	IEC Measurement Category II – CAT II equipment is designed to protect against transients from energy-consuming equipment supplied from the fixed installation, such as TVs, PCs, portable tools, and other household circuits.	CAT III	IEC Measurement Category III – CAT III equipment is designed to protect against transients in equipment in fixed equipment installations, such as distribution panels, feeders and short branch circuits, and lighting systems in large buildings.
	Do not dispose of this product as unsorted municipal waste. Go to Fluke's website for recycling information.		

Instrument Overview

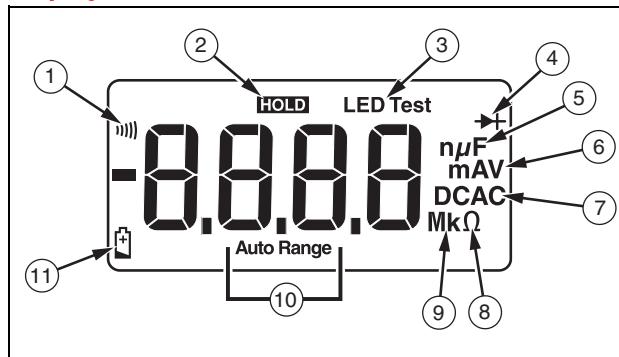
Terminals



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Item	Description
1	Input for 0-A to 10.00-A current measurements.
2	Input for 0-A to 400-mA current measurements.
3	Common (return) terminal for all measurements.
4	Input for voltage, continuity, resistance, diode test, capacitance, and LED forward voltage (V_F) measurements.

Display



Item	Description
1	Continuity selected
2	Display Hold is enabled
3	LED Test selected
4	Diode test is selected
5	F – Farads for capacitance
6	A, V – amps or volts
7	DC, AC – dc or ac voltage or current
8	Ω - Ohms is selected.
9	m, M, k – decimal prefix
10	Auto range selected
11	Battery is low and should be changed

Battery Saver

The Meter enters the “Sleep mode” and blanks the display if the Meter is not used and the input is inactive for 30 minutes. Press any button or turn the rotary switch to wake the Meter up. To disable the Sleep mode, hold down the YELLOW button while turning the Meter on.

Note

When in the Sleep mode, the Meter is still drawing power from the battery. Turn the rotary switch to OFF to save the battery if the Meter is not to be used for a long time.

How to Take Measurements

Manual and Auto Range Selection

The Meter has both manual and auto range options. In the auto range mode, the Meter selects the best range for the input detected. This allows you to switch test points without having to reset the range. You can override auto ranging by selecting the range manually.

The Meter defaults to the auto range mode in measurement functions that have more than one range. When the Meter is in the auto range mode, **Auto Range** is displayed.

To enter and exit the manual range mode:

1. Press **RANGE**.
2. Each press of **RANGE** increments the range. When the highest range is reached, the Meter wraps to the lowest range.
3. To exit the manual range mode, press and hold **RANGE** for two seconds.

Data Hold

To hold the present reading, press **HOLD**. Press **HOLD** again to resume normal operation.

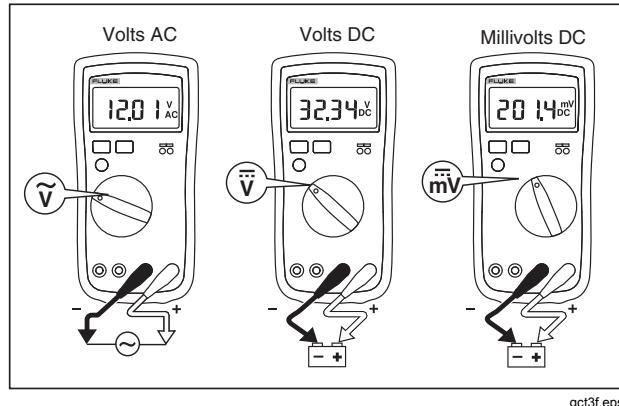
AC or DC Voltage Measurements

To minimize improper reading of a voltage containing either ac or ac + dc voltage components, select the ac voltage function on the meter and note the ac range required for a good measurement. Next, manually select the dc function with the dc range that either matches or is higher than the previously noted ac range. This procedure minimizes the effects of ac transients while making accurate dc measurements.

1. Choose ac or dc by turning the rotary switch to \tilde{V} , \overline{V} , or \overline{mV} .
2. Connect the red test lead to the $\frac{V}{\Omega}\frac{mV}{\mu A}$ terminal and the black test lead to the **COM** terminal.
3. Measure the voltage by touching the probes to the desired test points of the circuit.
4. Read the measured voltage on the display.

Note

The only way to access the 400 mV ac range is by manual ranging.



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Figure 1. AC and DC Voltage Measurements

AC or DC Current Measurements

1. Turn the rotary switch to $\frac{\text{~A}}{\text{mA}}$, $\frac{\text{~mA}}{\text{~A}}$, or $\frac{\text{~\mu A}}{\text{~\mu A}}$.
2. Toggle between ac or dc current measurement by pressing the YELLOW button.
3. Connect the red test lead to either the **A**, or **mA** **μ A** terminal based on the current to be measured and connect the black test lead to the **COM** terminal.
4. Break the circuit path to be measured. Then connect the test leads across the break and apply power.
5. Read the measured current on the display.

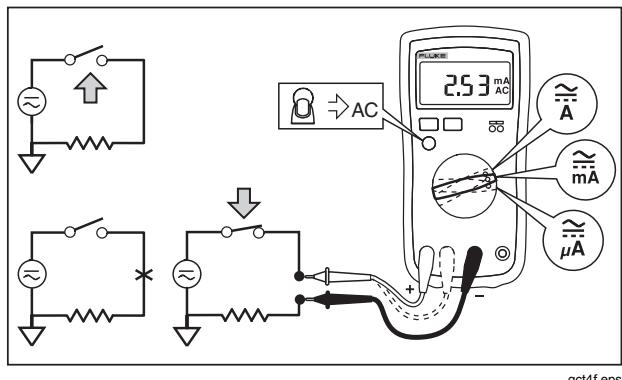


Figure 2. AC and DC Current Measurements

Resistance Measurements

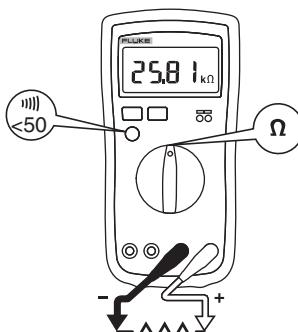
⚠ Caution

To avoid possible damage to the Meter or to the equipment under test, disconnect circuit power and discharge all high-voltage capacitors before measuring resistance.

1. Turn the rotary switch to $\frac{\text{~\Omega}}{\text{~k\Omega}}$. Make sure power is disconnected from the circuit to be measured.
2. Connect the red test lead to the $\frac{\text{~V~\Omega}}{\text{~mV~\Omega}}$ terminal and the black test lead to the **COM** terminal as shown in Figure 3.
3. Measure the resistance by touching the probes to the desired test points of the circuit.
4. Read the measured resistance on the display.

Continuity Tests

With the resistance mode selected, press the YELLOW button twice to activate the continuity beeper. If the resistance is under 50Ω , the beeper will sound continuously, designating a short circuit. If the Meter reads OL , the circuit is open.



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Figure 3. Resistance/Continuity Measurements

Diode Tests

⚠ Caution

To avoid possible damage to the Meter or to the equipment under test, disconnect circuit power and discharge all high-voltage capacitors before testing diodes.

1. Turn the rotary switch to $\frac{\text{V}\ \Omega}{\text{DCV}}$.
2. Press the YELLOW function button once to activate Diode Test.
3. Connect the red test lead to the $\frac{\text{V}\ \Omega}{\text{LEDV}}$ terminal and the black test lead to the COM terminal.

4. Connect the red probe to the anode side and the black test lead to the cathode side of the diode being tested.
5. Read the forward bias voltage value on the display.
6. If the polarity of the test leads is reversed with diode polarity, the display reading shows OL . This can be used to distinguish the anode and cathode sides of a diode.

Capacitance Measurements

⚠ Caution

To avoid damage to the Meter, disconnect circuit power and discharge all high-voltage capacitors before measuring capacitance.

1. Turn the rotary switch to $\frac{\text{V}\ \Omega}{\text{DCV}}$.
2. Connect the red test lead to the $\frac{\text{V}\ \Omega}{\text{LEDV}}$ terminal and the black test lead to the COM terminal.
3. Touch the probes to the capacitor leads.

After allowing the reading to stabilize (up to 15 seconds), read the capacitance value on the display.

LED Tests

⚠ Caution

To avoid possible damage to the Meter or to the equipment under test, disconnect all test leads from any hazardous voltage before switching to the LED TEST function.

The Meter tests Light Emitting Diodes (LEDs) either through the LED test socket on the Meter or through the test leads.

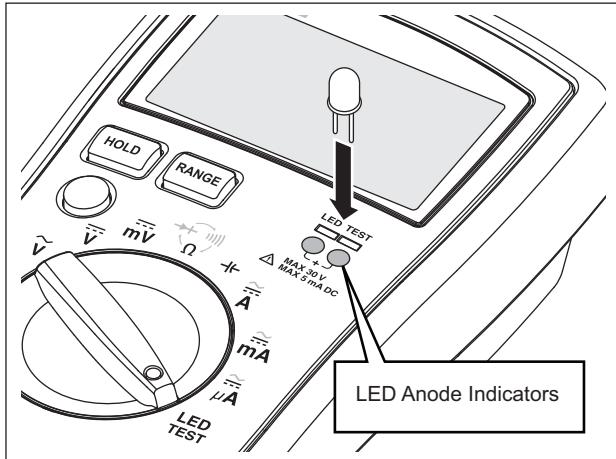
Note

Do not use the LED Test mode to do LED aging tests.

To test an LED mounted in the test socket:

1. Turn the rotary switch to LED TEST.
2. Place the leads of the LED into the holes of the LED test socket on the front of the Meter as shown in Figure 4.

If the LED is functioning correctly, the LED in the test socket will illuminate. Also, the LED on the Meter next to the pin that has the LED anode (+) inserted in it will illuminate. If bad, then the LED will not illuminate.



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Figure 4. LED Test Socket

To test an LED with the test leads:

1. Turn the rotary switch to LED TEST.
2. Connect the red test lead to the $\frac{V_{LED}}{\Omega}$ terminal and the black test lead to the COM terminal as shown in Figure 5.
3. Touch the test lead tips to the LED leads.

If the LED is functioning correctly, the LED should illuminate and the display on the Meter will indicate the forward bias voltage on the LED. If the displayed value is positive, then the lead connected to the $\frac{V_{LED}}{\Omega}$ terminal is touching the anode (+) of the LED. If a negative value, then the COM terminal is connected to the anode (+) of the LED. If the LED is bad, then the LED will not illuminate and the Meter display will indicate close to 00.00.

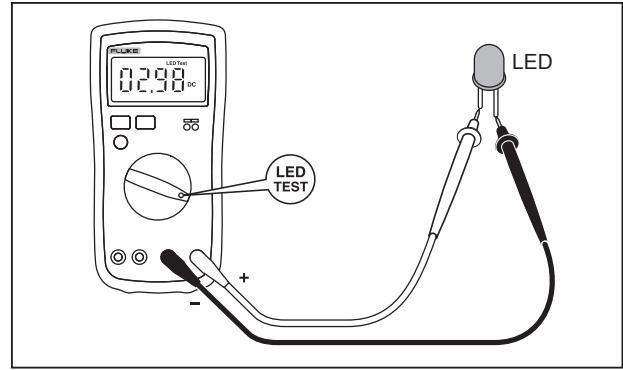


Figure 5. LED Test using Test Leads

Note

An LED placed in the test socket can be tested at the same time an LED is tested using the Meter leads. The forward bias voltage (V_F) is only displayed when testing through the test leads.

Maintenance

Beyond replacing batteries and fuses, do not attempt to repair or service your Meter unless you are qualified to do so and have the relevant calibration, performance test, and service instructions. The recommended calibration cycle is 12 months.

General Maintenance

Periodically wipe the case with a damp cloth and mild detergent. Do not use abrasives or solvents.

Dirt or moisture in the terminals can affect readings.

To clean the terminals:

1. Turn the Meter OFF and remove all test leads.
2. Shake out any dirt that may be in the terminals.
3. Soak a clean swab with mild detergent and water. Work the swab around in each terminal. Dry each terminal using canned air to force the water and detergent out of the terminals.

Testing the Fuses

⚠️⚠️ Warning

To avoid electric shock or injury, remove the test leads and any input signals before replacing the fuses.

1. Turn the rotary switch to .
2. Plug a test lead into the  ^{V Ω} _{LED V} terminal and touch the probe to the **A** or **mA μA** terminal.
 - A good **A** terminal fuse is indicated by a reading between 000.0 Ω and 000.1 Ω . A good **mA μA** terminal fuse is indicated by a reading between 0.990 k Ω and 1.010 k Ω .
 - If the display reads **OL**, replace the fuse and test again.
 - If the display shows any other value, have the Meter serviced. See "Service and Parts" later in the manual.

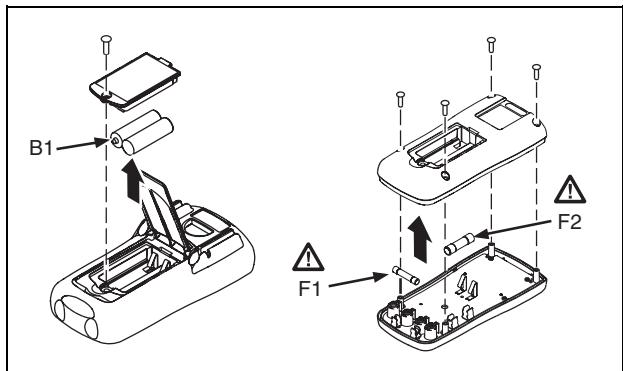
Replacing the Batteries and Fuses

⚠️⚠️ Warning

To avoid false readings, which could lead to possible electric shock or personal injury, replace the batteries as soon as the battery indicator () appears.

To prevent damage or injury, install ONLY replacement fuses with the specified amperage, voltage, and interrupt ratings.

Disconnect test leads before opening the case or the battery door.



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⚠ F1 Fuse, 500 mA, 1000V	Fluke PN 1989732
⚠ F2 Fuse, 10 A, 1000V	Fluke PN 1989726
B1 Battery, 2 X AA Alkaline NEDA 15A, IEC LR6	Fluke PN 376756
Battery Door	Fluke PN 1884065

Service and Parts

If the Meter fails, first check the batteries and fuses, then review the manual to make sure that you are operating the Meter correctly.

To contact Fluke call:

- Technical Support USA: 1-800-44-FLUKE
(1-800-443-5853)
- Calibration/Repair USA: 1-888-99-FLUKE
(1-888-993-5853)
- Canada: 1-800-36-FLUKE (1-800-363-5853)
- China: +86-10-6512-3435 or +86-400-810-3435
- Europe: +31 402-675-200
- Japan: +81-3-3434-0181
- Singapore: +65-738-5655
- Anywhere in the world: +1-425-446-5500

Or, visit Fluke's website at www.fluke.com.

To register your product, visit <http://register.fluke.com>.

To view, print, or download the latest manual supplement, visit <http://us.fluke.com/usen/support/manuals>.

General Specifications

Maximum voltage between any terminal and earth ground	.....1000 V
△ Fuse for mA µA input:	.....500 mA, 1000 V FAST, Min. Interrupt Rating 20,000 A
△ Fuse for A input:	.....10 A, 1000 V FAST, Min. Interrupt Rating 20,000 A
Display	.....Digital: 4,000 counts, updates 3/sec
Temperature	.....Operating: 0 °C to 40 °C Storage: -30 °C to +60 °C indefinitely (to -40 °C for 100 hours)
Temperature Coefficient	.....0.1 x (specified accuracy)/°C (<18 °C or >28 °C)
Operating Altitude	.....0 to 2,000 meters
Electromagnetic Compatibility	.....Complies with FCC Part 15, Class B, IEC 61326, 3 V/m, performance criterion A
Rated Transient Overvoltage	.....6 kV (1.2 x 50 µs) Peak for measurement Categories I, II, and III.
Relative Humidity	.....Noncondensing <10 °C, 90 % from 10 °C to 30 °C; 75 % from 30 °C to 40 °C
Relative Humidity, 40 MΩ Range	.....80 % from 10 °C to 30 °C; 70 % from 30 °C to 40 °C
Battery	.....2 X AA, NEDA 15A / IEC LR6
Battery Life	.....Alkaline: 500 hours (50 hours in LED Test mode without load. The hours with load depends on the type of LED under test.)
Size (H x W x L)	.....180 mm x 89 mm x 51.5 mm
Weight	.....425 grams
Safety Compliances	.....Complies with ANSI/ISA 82.02.01 (61010-1) 2004, CAN/CSA-C22.2 No 61010-1-04, UL 6101B (2003) and IEC/EN 61010-1 2 nd Edition to 1000 V Measurement Category II and 600 V Measurement Category III, Pollution Degree 2, EMC EN61326-1
Certifications	.....CMC, CE

Detailed Specifications

Accuracy is specified for 1 year after calibration, at operating temperatures of 18 °C to 28 °C. Accuracy specifications take the form of: $\pm([\% \text{ of Reading}] + [\text{Number of Least Significant Digits}])$.

AC and DC Voltage

Function	Range	Resolution	Accuracy
AC Volts (40 to 500 Hz) 	400.0 mV ^[1]	0.1 mV	3.0 % + 3
	4.000 V	0.001 V	1.0 % + 3
	40.00 V	0.01 V	
	400.0 V	0.1 V	
	1000 V	1 V	
DC Millivolts 	400.0 mV	0.1 mV	1.0 % + 10
DC Volts 	4.000 V	0.001 V	0.5 % + 3
	40.00 V	0.01 V	
	400.0 V	0.1 V	
	1000 V	1 V	

[1] Manual range only.

Diode Test, Resistance and Capacitance

Function	Range	Resolution	Accuracy
Diode Test ^[1] ►	1.000 V	0.001 V	10 %
Resistance (Ohms) Ω	400.0 Ω	0.1 Ω	0.5 % + 3
	4.000 kΩ	0.001 kΩ	0.5 % + 2
	40.00 kΩ	0.01 kΩ	
	400.0 kΩ	0.1 kΩ	
	4.000 MΩ	0.001 MΩ	
	40.00 MΩ	0.01 MΩ	1.5 % + 3
Capacitance ^[2] ↖	50.00 nF	0.01 nF	2 % + 5
	500.0 nF	0.1 nF	
	5.000 μF	0.001 μF	5 % + 5
	50.00 μF	0.01 μF	
	100.0 μF	0.1 μF	

[1] Diode test open circuit test voltage is 1.1 V to 1.6 V and short circuit current is <0.6 mA (typical).

[2] Specifications do not include errors due to test lead capacitance and capacitance floor (may be up to 1.5 nF in the 50 nF range).

LED Test

Function	Lighting Range	Measurement Range	Resolution	Accuracy
LED V _F Test ^[1] (LED Test Socket)	2.00 to 6.00 V	NA	NA	NA
LED V _F Test ^[2] (Test Leads)	2.00 to 6.00 V	2.00 to 6.00 V	0.01 V	10 %

[1] Open circuit test voltage is ± 15 V and short-circuit current is $<\pm 5$ mA (typical).
[2] Open circuit test voltage is ± 15 V and short-circuit current is $<\pm 3$ mA (typical)

AC and DC Current

Function	Range	Resolution	Accuracy
AC Current (40 to 200 Hz) μA	400.0 μA	0.1 μA	1.5 % + 3
	4000 μA	1 μA	
AC Current (40 to 200 Hz) mA	40.00 mA	0.01 mA	1.5 % + 3
	400.0 mA	0.1 mA	
AC Current (40 to 200 Hz) A	4.000 A ^[1]	0.01 A	1.5 % + 3
	10.00 A	0.01 A	
DC Current μA	400.0 μA	0.1 μA	1.5 % + 3
	4000 μA	1 μA	
DC Current mA	40.00 mA	0.01 mA	1.5 % + 3
	400.0 mA	0.1 mA	
DC Current A	4.000 A ^[1]	0.01 A	1.5 % + 3
	10.00 A	0.01 A	

[1] When in the 4A range, display will show 4000 counts, ignore the last digit.

Input Characteristics

Function	Overload Protection	Input Impedance (Nominal)	Common Mode Rejection Ratio	Normal Mode Rejection
AC Volts	1000 V	10 MΩ <100 pF	>60 dB at dc, 50 or 60 Hz	--
DC Volts	1000 V	10 MΩ <100 pF	>60 dB at dc, 50 or 60 Hz	>45 dB at 50 or 60 Hz

10⁶ V Hz Max